ON

INTESTINAL CONCRETIONS.

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INTESTINAL CONCRETIONS.

THE formation of concretions within some portion of the alimentary canal is of no infrequent occurrence in the lower animals.

The history of comparative pathology is replete with instances of the bezoar stones, formed in the camel, goat, and antelope. And the confident belief which at one time attributed to the padi-zeher or bezoar stone the virtues of an alexipharmiac, or poison antidote, has imported into most of the ancient and mediæval works upon pharmacy extended notices of remarkable specimens of these formations, which have sometimes, even in Western Europe, fetched a price so high as 6000 livres, and the hire of a ducat a day when lent out for a single occasion.

The substance so familiarly employed in the perfumer's art, under the name of ambergris, is originally formed in the large intestine of the spermaceti whale, a single mass of which has been known to attain to the gigantic size of 5 feet 8 inches in diameter, weighing 182 pounds, and fetching as a first price 11,000 dollars.[1]

The large masses of felted hair which form the ægagropiles of herbivora,[2] and the masses or balls of debris composed of the claws, feathers, hairs, and bones of their victims ejected by birds of prey,[3] are sufficiently familiar to all the members of the Society.

In the human subject such formations have been frequently enough met with,[4] and were, in Scotland more especially, at a former period far from being uncommon. Since, however, the preparation of the oat for domestic use has been conducted by something more

[1] Philos. Trans., 1734. Id., lxxxi.

[2] La Fosse, Cours d' Hippiatrique, p. 158. Annales de Chimie, tom. xx. Philos. Trans., xxiv. 1703, Thoresby. Id., xliv. 1746, Bailey. Id., xlviii. 1754, Watson. Id., xxxiv., No. 398.

[3] M. Jules Cloquet, Memoir sur les Concretions Intestinales, lu a l'Academie des Sciences, dans la Séance du 29 Janvier 1855.—Notes et Observations, No. 77.

[4] M. Lawer, by Dr Konig, Philos. Trans., 1686, weighed 5 lbs. Martineau, Philos. Trans., 1722–23, 8 inches circumference, 6⅝ in. length, weighed 2 oz. 16 dwts. 12 grs. Mr Mackarness, Philos. Trans., 1739–41, 10½ in. circumference, weighed 8½ oz. Samml. Med.-Wahrn. Band ix., p. 231, weight ½ lb. M. Daabal, Discursus Academ. de Esthera Norra, Lund. 1715, 8vo. Sir H. Sloan refers to Birch Hist. 1685, 200 concretions. Edin. Med. Comm., vol. viii., p. 329, weight, 8 oz. and 3 drs. Luzoni met with 10 concretions; Bilgner 20 in the stomach; Turne in one case met with 14, in another case 18 in the large intestine.

effectual than the imperfect thrashing, winnowing, grinding, and sifting in familiar use in every farm throughout the country in the early part of the century, cases of enteroliths in the human subject have become rarer and rarer.

The vegetable and fibrous character of the nucleus of these human enteroliths was long ago indicated by Fourcroy and Vauquelin,[1] while Drs Duncan,[2] Thomas Thomson, and John Davy, from their analysis of some specimens belonging to the unrivalled collection of Dr Munro, state distinctly that they contain a substance analogous to or identical with vegetable fibre. The source of this vegetable fibre was, however, a matter of doubt until the sagacious suggestion of Mr Clift, conservator of the Royal College of Surgeons of England, "whether it might not proceed from oats," led to the examination of the microscopic structure of this cereal by Dr Wollaston, with the result of verifying Mr Clift's conjecture.[3]

Dr Douglas Maclagan has more recently and fully elucidated this subject. His paper[4] contains a valuable description and analysis of two enteroliths of this kind, the one sent him by Mr Turner of Keith, the other belonging to Mr Syme, and obtained from the Highlands. In regard to these cases, Dr Maclagan remarks, "From these observations, there can be no doubt that the correct statement as to the constitution of these concretions is that they are composed essentially of the hairs of the caryopsis of the oat, mixed with fragments of the husk of the grain."

For the formation of the intestinal calculi, two circumstances seem to be necessary:—

1. The existence of a foreign body in the intestines for a sufficient length of time to permit the accretion of a deposit on its surface.

2. The presence in the economy of a sufficient amount of calcareous salts to furnish a calcareous concretion.

The foreign body, which acts as an irritant, and upon which the calcareous deposit is collected, can constantly be recognised in the centre of these enteroliths when a section is made of the concretion. The properties essential to its fulfilling that nuclear function are, that it should be insoluble in the gastric or intestinal juices. Thus, animal hairs and insoluble vegetable fibres and hairs have been discovered in a large proportion of the cases composing the nucleus, but a gall-stone, or fruit-kernel may serve the purpose and afford the necessary surface for further accumulations. Pins, needles, small nails,[5] pieces of bone, as well as stones of fruit, have been observed forming the nuclei of alvine concretions.

[1] Annales du Museum, vol. iv.

[2] Edin. Med. and Surg. Journal, vol. xxiv., p. 87. Monro, Morbid Anatomy of the Gullet, Stomach, and Intestines, 2d edition, p. 27, p. 35.

[3] Marcet, Calculous Disorders.

[4] Edinburgh Monthly Medical Journal, September 1841, p. 648.

[5] Philos. Trans., xlviii. 1754, Watson. Id., xliv. 1746.

In illustration of the capacity of gall-stones for forming the nucleus of an intestinal concretion, I may mention the following instance which occurred to me about a year ago:—

I was requested to see Mrs ——, who had suffered from a very severe attack of hepatic colic, due to the passage, it was believed, of a gall-stone, but who had not, when I saw her, passed any such formation in the excretions. There had been, however, after the subsidence of the colic, a good deal of intestinal uneasiness characterized by shifting pain, flatulence, and constipation. These symptoms had abated under the influences of a dose of castor-oil and laudanum, which had afforded a loose bilious evacuation. The patient complained of pain at the fundament so severe as to cause her to scream when the bowels threatened to act, together with the sensation of a solid mass which came down to the orifice, as she expressed it, and then went up again. On placing the patient under the influence of chloroform, and examining the bowel, I at once recognised a fissure of the anus extending up the depth of the sphincter. This ulcerated chap I divided in the ordinary manner, and on carrying the finger higher in the bowel came in contact with a dense mass of the consistence of putty, about the size of a large orange, but of an ovoid form. This was situated too high up to reach its distal side with the finger. I accordingly made use of the shank of a silver tablespoon, by means of which I broke it down, and extracted it piecemeal from the rectum. The mass consisted in great part of fæces of a putty or pipe-clay colour, but as thickly studded with gall-stones as a plum-pudding with raisins and currants. Had this mass remained unremoved for a lengthened period of years, there can, I think, be little doubt it too would have been encrusted with calcareous matter, and thus have given rise to the formation of a true enterolith.

I suspect however, that the rectum is not that portion of the intestinal tube best suited for affording a calcareous incrustation upon matters long retained in its cavity, as is illustrated by the following case.

I was requested by Dr Husband in 1860 to see with him a young man suffering from retention of urine, in whom some difficulty existed in introducing the catheter. The patient had long been the subject of paraplegia, and the atrophied limbs were so curled across each other, and folded over the pubis and abdomen, as to render it a matter of difficulty to gain access to the urethral orifice. The catheter when inserted passed easily enough as far as the membranous portion of the urethra, but here its further progress was completely arrested. On introducing my finger up the rectum to determine the cause of this anomalous state of matters, its progress was opposed by a mass contained within the bowel, occupying the entire limits of the true pelvis, and of a consistence so hard that I could not introduce my finger into its substance. Scraping the surface with the nail, I brought away a sufficient quantity of the mass to convince me that its bulk was com-

posed of hardened fæces. As this was manifestly the obstacle which prevented the escape of urine and the introduction of the catheter, I determined, with the approval of Dr Husband, to break it down and extract it from the bowel. I effected this, after much labour, by means of the handle of an iron spoon, and now found the catheter could be introduced into the bladder without difficulty. On examining the broken-down mass which formed the ball, I found it was in great part composed of hardened fæces, combined with which there was intermixed a quantity of fibrous substance like tow. There was however no manifest calcareous coating to any portion of the mass. But in the operation of breaking down, the shank of the metal spoon seemed constantly to grate against calcareous particles mixed with the general mass. This patient had long suffered from constipation of the bowels, but for some years past had experienced alternating attacks of constipation and diarrhœa of a dysenteric type, or with symptoms of proctitis. I could obtain no history to account for the fibrous substance in the fæculent mass. The patient had never swallowed such material intentionally, nor had it ever been inserted into the anus as a plug to check a troublesome diarrhœa, a plan I have known resorted to among soldiers.[1]

To explain the existence of the felt-like residuum of the calculus which has been so constantly observed in cases of regular bezoars, or enteroliths, need occasion no difficulty in those instances where hairs, capable of being formed into felt, compose the mass of the concretion. The difficulty has chiefly existed to explain the accumulation of such delicate fibres and hairs as those met with in the vegetable kingdom, which are not specially endowed with fine processes projecting from the surface, on which the facility in producing felt with the hair of rabbits and hares is now known to depend. This difficulty will, however, be removed when we consider the following facts:—(1.) That in the drain-pipes of domestic houses obstructions are constantly produced by masses or balls of human hair, which have apparently accumulated from the combings of hair-brushes. (2.) Marine ægagropiles are apparently formed by the rolling motion of the waves, weaving together into ball-like masses the fibres of marine plants subjected to their action. (3.) Similarly, in our own country, the needle-like leaves of the larch dropping into fresh-water, are susceptible of being moulded into these singular balls, composed of woody fibre, resembling the *fir-wool*, or brownish cottony substance employed in some parts of Germany for the manufacture of textile fabrics. (4.) Clay balls are frequently met with in the interior of the common garden roller, and may even contain a nucleus which rattles within the dry outer layers when the mass is shaken.[2]

The different appearances presented by the enteroliths, are

[1] M'Lauchlan, London Medical Gazette, vol. xxix., p. 846, 1842.

[2] This last fact was mentioned and illustrated by examples by Dr George W. Balfour at the meeting of the Edinburgh Medico-Chirurgical Society, 5th February 1868.

apparently to be referred to two causes. 1. The original formation of the concretion; and, 2. The length of time it has been allowed to remain in the intestine. If the foreign substance has not been long retained, it will present the aspect of felt, more or less mixed with fæculent matters. If, again, the foreign accumulation remains lodged for a long period, the ball becomes coated with calcareous salts, mixed with the elements of the bile, presenting a curious varnished or enamelled look, or, in some instances, encrusted with a calcareous shell, formed of a number of layers of saline matters arranged in concentric circles.

The form of the enterolith is apparently modified by (1.) The form of the nucleus, when such exists; (2.) The effects of the peristaltic movements of the gut in which the calculus is contained; and (3.) The existence of *one* or more of these concretions—in the latter instance the form being modified by mutual friction.

All these features will be illustrated by the history and appearance of the intestinal concretions I have now the honour of bringing before the notice of the Society.

In the early part of the month of August 1867, I was requested by Dr Bowie to examine a patient, J. T., by whom he was accompanied. He complained of a sense of weight and fulness in the region of the rectum, frequent desire for stool, and a complete inability to pass anything except flatus and fluid excrement, saying that a lump came down with every effort, and blocked up the passage. The patient was a spare, thin, pallid man of upwards of fifty, who had long been in bad health, suffering for more than twenty years from indigestion, characterized by abdominal pains, sickness, and vomiting, with frequent constipation. Gentle aperients, which he required to take frequently, alone afforded relief.

On examining the anus, nothing wrong could be perceived; but on introducing the finger up the bowel, two large calculi could at once be recognised, conveying much the sensation experienced on introducing the finger into the bladder in the operation of lithotomy.

Feeling that, with one finger, it was impossible to steady the calculi so as to effect their extrusion, I introduced the fore and middle fingers together, and at once effected the ejection, first of one, and then of the other stone. Whenever this was effected, the patient experienced complete relief from all the painful symptoms which had annoyed him for so long a period.

The only further fact in the history of the case which I was able to elicit was, that some years ago a hard lump had been recognised in the right hypochondriac region. He had consulted, as he said, everybody in regard to this swelling, which could be distinctly felt through the abdominal parietes. But while he received various opinions and different advices, the swelling moved gradually towards the left hypochondriac region, and then disappeared. Since then he had not recognised the existence of any swelling. Coincidently with the disappearance of the tumour, the uneasy sensations in the rectum commenced, for which he sought advice in

various quarters, and had the symptoms treated as piles by some, as constipation by others, and as dysentery by those who saw him when the irritation was accompanied with the discharge of liquid motions, mixed with mucus and blood.

The calculi extracted were two in number, and occupied relatively the position of an upper (A) and an under stone (B). The under stone was the larger, and presented dark eyes or facets on several sides; the upper was lenticular and concave, the hollow surface lying in contact with the facets of the lower stone, which, as it was turned with the peristaltic action of the bowel, it obviously polished by friction. The close resemblance of the calculi to flints, as they were forcibly ejected from the bowel, made me almost ask the man how he came to have flints up his fundament, whether he put them there, or when he had swallowed them; but the lightness of the calcareous mass, when I held them in my hand, at once undeceived me, and assured me that I had no natural pebbles to deal with, but a case of genuine intestinal concretions.

For the following accurate description, together with the analysis and microscopic appearances of these calculi, I am indebted to my friend, Dr Fraser:—

"*Report of Examination of Two Intestinal Concretions from a Patient of Dr P. H. Watson.*

"Each concretion was obtained in two portions. One concretion consists entirely of a dense stone-like body: the two portions of this are labelled '1 *a*' and '2 *a*.' The other consists of a dense crust and shell surrounding a large soft and friable nucleus: its two portions are labelled and referred to in this report as '1 *b*' and '2 *b*.' They have both an unmistakable fæcal odour.

A. "*Weight*, ... '1 *a*' = 123 grs.
'2 *a*' = 415 grs.

"Total weight, ... 538 grs.

As more or less must have been lost in making the section of this concretion, its original weight was above 538 grs.

"It has an irregular, slightly nodulated form, and has a length and breadth of about one inch and three-eighths, and a thickness of one inch and an eighth.

"The surface is principally of a stone colour, and covered with minute, glistening crystals; but there are several irregular patches of a grayish-brown colour, smooth, and without crystals.

"The section shows this concretion to consist of concentric layers of alternating pale-brown and grayish-white. The *crust* is an extremely thin pale-brown layer; the *shell* forms the great portion of the concretion; and the *nucleus* is a minute, dense, pale-brown body, with a long diameter of about an eighth of an inch, and apparently similar in composition to the pale-brown concentric layers of the shell. From the arrangement of some of the rings, it is probable that a second nucleus existed, but it has been destroyed in making the section.

A

"The *composition* has been found to be in great part phosphate and carbonate of lime, and ammoniaco-magnesian phosphate. Small quantities of soda, cholesterine, and fatty matter, and traces of silica and of bile pigments, were also discovered. The nucleus consists principally of phosphate of lime.

"This concretion is not, therefore, of biliary origin, and its composition agrees with that of previously described intestinal calculi.

B. "*Weight*, ... '1 *b*' = 289
'2 *b*' = 338

"Total weight, ... 627 grs.

As some loss must have occurred in dividing this concretion, its original weight was more than 627 grs.

"Its form is an irregular cube. The two largest opposite surfaces have each three unequal prominences, the summits and a considerable portion of whose surfaces are of a shining black colour.

"The greatest length and breadth of this concretion is about one inch and three-eighths, and the greatest thickness rather more than one inch and two-eighths. The *crust* and *shell* together vary

from two-eighths to one-eighth of an inch in thickness, and consist of concentric rings, one of a pale brown alternating with one of a dirty gray colour.

"The greatest portion of this concretion consists of a brownish-gray, soft and friable *nucleus* of an apparently cubical form, and in the exposed section, having a diameter of from one to one-and-an-eighth inch.

"The *crust* and *shell* were found to be composed chiefly of phosphate and carbonate of lime, and of ammoniaco-magnesian phosphate; traces were also obtained of cholesterine, of bile pigments, of silica, of fatty matter, and of an extractiform body having a strong fæcal odour.

"The *nucleus* was found to consist of at least 85 per cent. of organic matter; the remainder was, in great part, composed of phosphatic salts and of carbonate of lime, and it contained a minute quantity of silica and of fat. When a small portion of the nucleus was examined with a high magnifying power, an immense number of short hairs were seen mixed up with fragments of cellular tissue, with well-marked spiral vessels, and with amorphous granular bodies.

"The hairs were about one-fifteenth of an inch in length and 1-1000th of an inch in thickness; but some were found to vary considerably from these measurements. They have a finely-pointed apex, and a somewhat rounded base, the latter being often similar to the bulb of an ordinary animal hair, and therefore at first suggesting an origin of this kind. A minute canal runs from the apex to the base, and, when water is added during the examination, it is seen to gradually extend along this tube.

"The addition of sulphuric acid and tincture of iodine produced a blue colour in the fragments of cellular tissue, and more or less distinctly in the spiral vessels and hairs. They were thus shown to be of vegetable origin; and a careful comparison has proved these hairs to be identical with those that occur on the surface of the seed of the oat (*Avena sativa*)."

These analyses and the microscopic examination will be seen to correspond in every particular to that given by Dr Maclagan[1] in the two cases he subjected to analysis.

	Mr Turner's.	Mr Syme's.
"Water	10	10
Albumen	2	2
Fæcal Matter	6	2
Soluble Vegetable Matter	8	8
Lactate of Soda	2	2
Salts (Muriates and Sulphates)	2	2
Fatty Matter (Stearic Acid)	8	4
Phosphate of Lime, with traces of Sulphate	20	20
Fibrous Matter	36	44
Silica	6	4
Loss	0	2
	100	100"

[1] Edinburgh Monthly Medical Journal, September, 1841.

Dr Maclagan, in speaking of the microscopic appearances of these two specimens he had an opportunity of examining, says—"On submitting portions of these concretions to examination by the microscope, the hairy matter of the oat was at once recognised as forming by far the largest proportion of the constituents of the concretions. When a portion of the mass, scraped down, was viewed under a magnifying power of 50 diameters, it presented the appearance of numerous hairs mixed with broken fragments of other matters, some of which were opaque, others being more or less translucent-like portions of vegetable membrane. The hairs varied in size, but were on an average about 1-16th of an inch long, and 1-1000th of an inch broad at the centre. When viewed with a magnifying power of 300 diameters, their tubular structure became at once apparent. The cavity contained what looked like dried cellular tissue. They were closed at the points, but readily admitted water by imbibition, which could be seen moving along the tube. Dr Wollaston thinks them to be pointed at both ends. This is not strictly the case. The apex is pointed, and they become thicker towards the centre, but the other extremity I found to be invariably broken off and open, and though they tapered towards the end, they were never found to be pointed."

The diagnosis of this case, so far as it came under my observation, was unattended by any difficulty. At an earlier period also, when the lump was recognised in the right hypochondriac region, and shifted thence to the left, any one acquainted with Professor Monro's observations should have found no difficulty in determining the nature of the affection. The early history of enteric concretions, consisting simply of a long period of digestive disturbance and uneasiness, may readily elude the diagnostic skill of the most painstaking and careful practitioner. If the nature of such a case were satisfactorily determined, beyond avoiding the cause of the formation in ill-ground and worse sifted oatmeal, the use of oleaginous substances which seem to interfere with the felting process, and the use of simple laxatives, there seems no room for interference. Nor while traversing the small intestines, if recognisable at that period, is there anything which can well be attempted, unless indeed gastrotomy were employed in a hopeless case of obstruction produced by such a cause. After the concretion has reached the large intestine, however, there seems no reason why the distending enemata recommended by M. Jules Cloquet[1] should not be resorted to as a means of facilitating their onward progress towards the rectum. This process he well describes under the name of "*Dilatation graduelle de l'intestin*," consists in separating the walls of the intestine gradually by an increasingly large quantity of liquid. For this purpose he recommends that a conical tube should be introduced into the rectum, so as to prevent the escape of fluid from the anus, while the forcible injection of fluid is employed for the purpose of distend-

[1] Memoir sur les Concretions Intestinales.

ing the bowel. The quantity of liquid which may be safely injected in such circumstances amounts, he says, to two litres.[1] By means of this the walls of the intestine are separated from the concretion, the whole passage is rendered more capacious, with less irregularity of surface and fewer curves. When accordingly the fluid is allowed suddenly to escape, the concretions are floated onwards, and sometimes even expelled from the anal orifice. These injections should day by day be increased in quantity until the desired result is attained.

When impacted in the descending colon, and accompanied by such unequivocal symptoms of obstruction of this part of the intestine which do not yield to milder measures, there appears to me no good reason to reject the recommendation of Monro[2] to perform colotomy according to the method proposed by Callisen,[3] and since perfected by Amussat.[4]

When lodged in the rectum, the employment of lithotomy forceps will undoubtedly afford a very great facility in effecting their removal; but, as we have seen, when these are not at hand, the fingers, either alone or aided by the shank of a spoon, will suffice for this purpose if the calculus is not too far removed from the anal orifice.

[1] The litre is equal to 0·2200967 British imperial gallon: the quantity mentioned in the text is therefore nearly equal to half a gallon.

[2] Monro, Morbid Anatomy of the Gullet, Stomach, and Intestines, pp. 47, 48, 49.

[3] Systema Chir. Hodern, tom. xi., p. 842, Hafniæ, 1817.

[4] Amussat's Memoir (p. 241), sur la possibilite d'etablir un Anus artificiel dans la région lombair sans pénétrer dans la Péritoine, Paris, 1832. Miller's System of Surgery, p. 1058–59. Holmes' System of Surgery, vol. iv., p. 176, *et seq.* Gross, Surgery, vol. ii., p. 685.

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